DAKOTA ACCESS, LLC

Energy Transfer Company

Dakota Access Pipeline Project

North Dakota Spill Model Discussion

WOOD GROUP MUSTANG

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1.0 PROJECT DESCRIPTION

The overall project is comprised of two separate but interconnected pipeline systems – the Dakota Access Pipeline (DAPL) and the Energy Transfer Crude Oil Pipeline (ETCOP). Together, DAPL and ETCOP form an approximately 1,167-mile long cross-country pipeline that will initially transport 450,000 barrels per day (BPD) of crude oil commencing at Stanley, North Dakota and ending at the Trunkline Pipeline tie-in located near Johnsonville, Illinois. Ultimately, the pipeline system will be capable of transporting 600,000 BPD of crude oil.

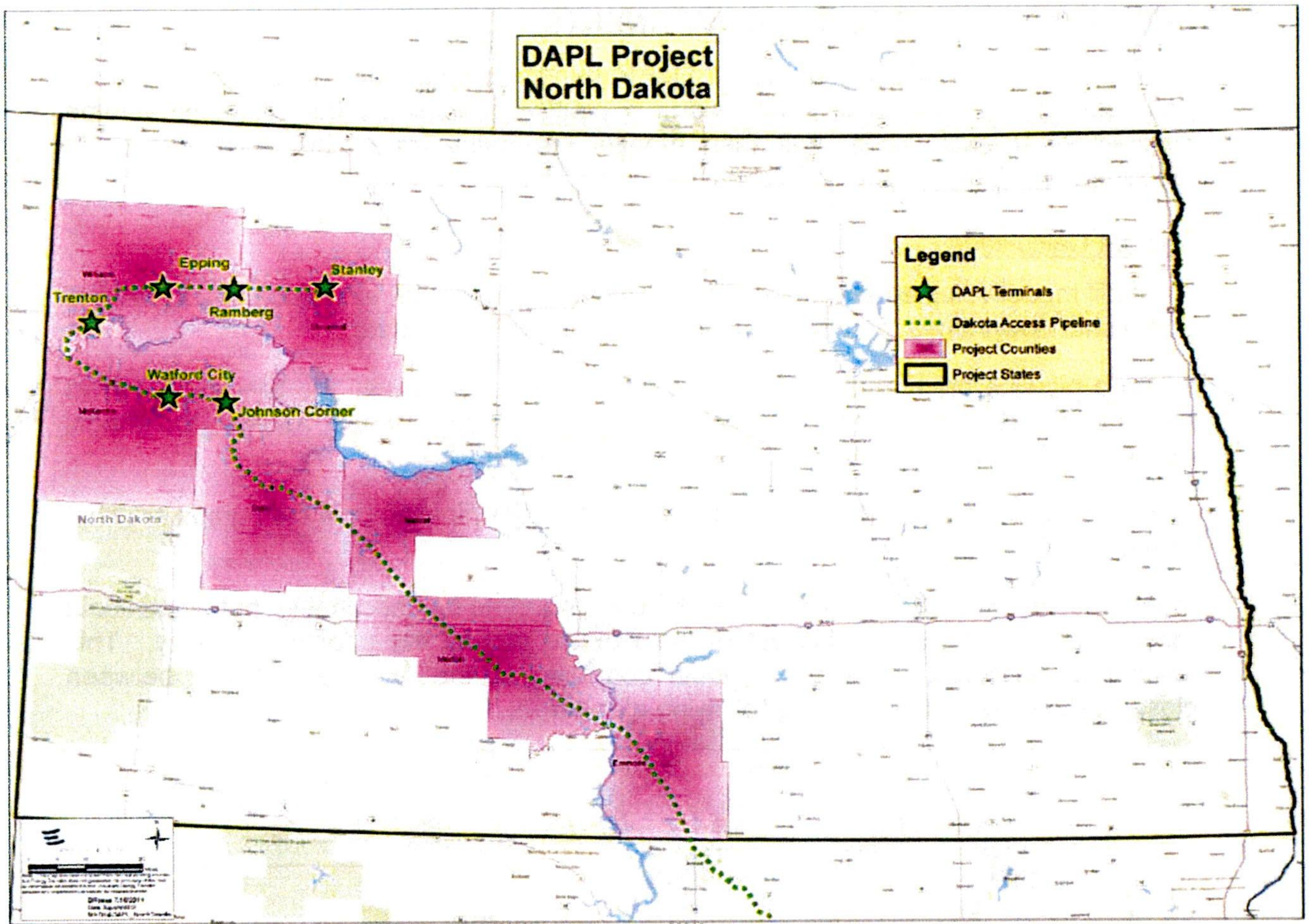
The DAPL system consists of approximately 148 miles of multi-diameter, crude oil supply pipelines in North Dakota and 1,019 miles of a 30-inch mainline that extends from the supply system in North Dakota to Patoka, Illinois. The supply system in North Dakota includes four pump stations. The 30-inch DAPL mainline has two pump stations - one each in South Dakota and Iowa.

The ETCOP system consists of 32 miles of 30-inch pipeline that begins downstream of the DAPL terminus in Patoka, Illinois and connects to the existing 570-mile, 30-inch Johnsonville-Boyce Trunkline located near Johnsonville, Illinois. The ETCOP pipeline system includes a new pump station at Patoka, Illinois.

Both the DAPL and ETCOP systems will be provided with scraper traps for pigging operations, mainline valve and emergency flow restricting devices, and a Supervisory Control and Data Acquisition system (SCADA) to control operations of the pipelines.

This report specifically discusses results of a spill model analysis performed for the entire project as pertains to North Dakota.

Maps of the overall DAPL / ETCOP system and of the DAPL system as it traverses through North Dakota have been provided on the next two pages.



2.0 SPILL MODEL – PURPOSE AND OVERVIEW

For the purposes of determining the relative consequences associated with a spill occurring along the DAPL pipeline system, a PHMSA–approved spill model was utilized.

This approach complies with 49 CFR Section 194.105 which requires a pipeline company to determine the relative impact of a worse-case release in each of its emergency response zones. This determination is based on the following factors:

- Maximum pump shutdown response time
- Longest duration for a mainline valve closure
- Maximum flowrate in the pipeline
- Largest opening in the pipeline (assumes a full-diameter pipeline separation)

The method by which the spill model determines the relative release volumes is outlined in the following pages.

- Liquid flow over land is governed by the characteristics and slope of the land surface. The land flow model takes into effect losses due to adhesion, the formation of small puddles, pooling in large depressions, and evaporation to the atmosphere.
- The water transport model moves oil on the water surface at a defined velocity and calculates oil lost to the shore from adhesion and oil evaporation to the atmosphere.

Effects of Adhesion

The amount of oil retained on the land surface as it flows down slope is determined by the nature of the land cover, e.g. dense vegetation is able to retain more oil than surface rock (ASCE 1969, Kouwen 2001, and Schwartz et al 2002).

Pooling on the land surface is the volume of oil retained within land depressions in the immediate area. The total oil lost to the ground is the sum of adhesion and pooling.

Effects of Evaporation

Oil evaporates as it spreads over land. The most volatile hydrocarbons (the light ends) evaporate rapidly - oftentimes in less than an hour (McAuliffe, 1989). The model uses a method called the Evaporative Exposure Model) of Stiver and Mackay (1984) which is used in most oil spill models to predict the evaporation rate.

In general, the rate of evaporation depends on surface area, composition of the crude oil, wind speed, and air and land temperature. The amount of oil evaporated is particularly sensitive to the surface area of the spreading oil and the time period over which evaporation is calculated.

The model software assumes evaporation ceases to occur once the total oil spill volume has been released. In reality, oil will continue to evaporate from the ground surface increasing the total evaporation amount. The model's conservative calculation of evaporative loss is consistent with a worst-case scenario approach.

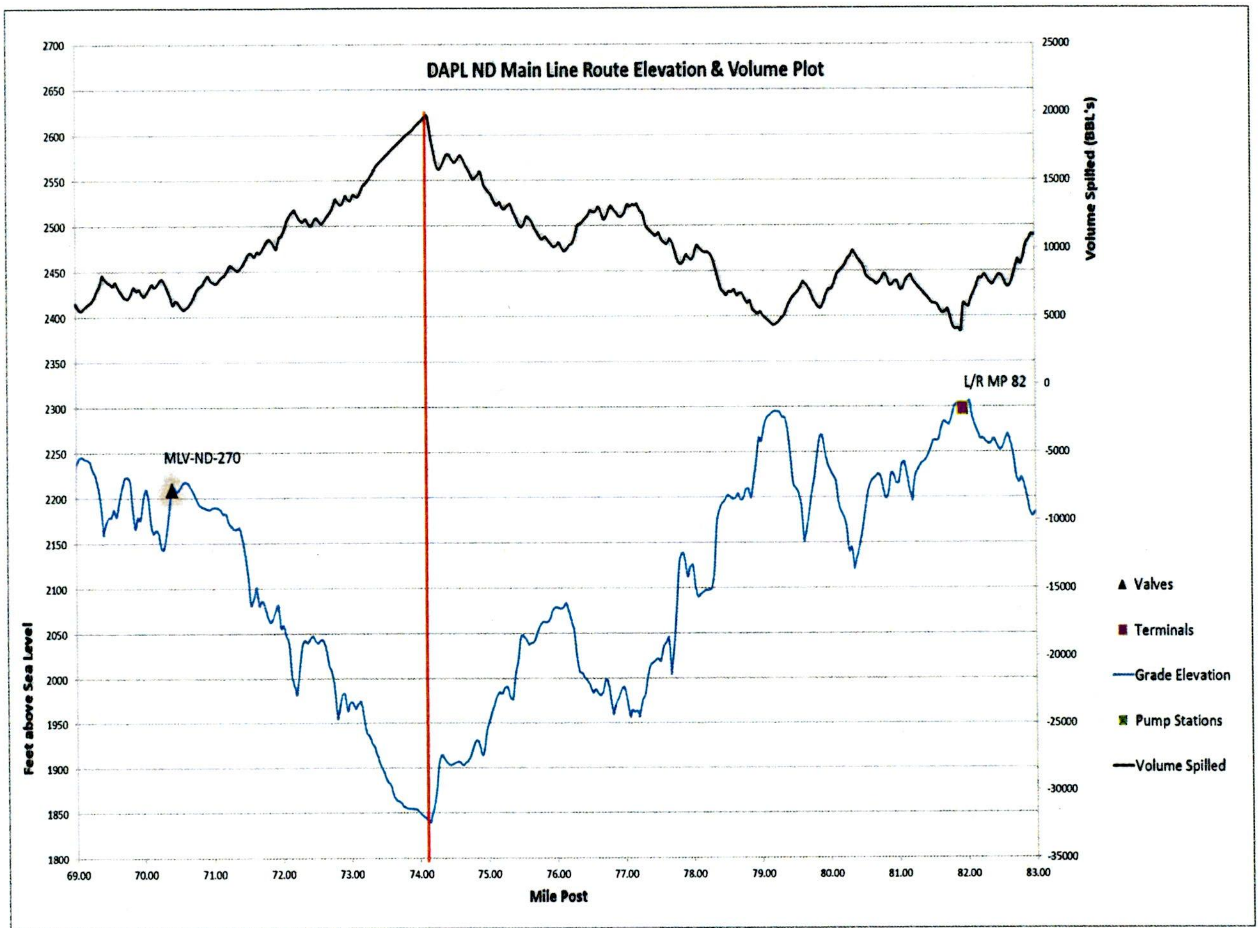
4.0 MODEL INPUT PARAMETERS

The following data is reflected in the DAPL model:

Pipeline	Diameter (inches)	Flow Rate (bbl/hour)	Detection and Shutdown*
Stanley to Ramberg	12	4,833	12.9 minutes
Ramberg to Trenton	20	13,170	12.9 minutes
Trenton to Watford City	24	18,880	12.9 minutes
Watford City to Johnson's Corner	30	18,880	12.9 minutes
Johnson's Corner - southward	30	25,000	12.9 minutes

* The mainline pumps are shutdown within 9 minutes, and the adjacent valves are closed within an additional 3.9 minutes.

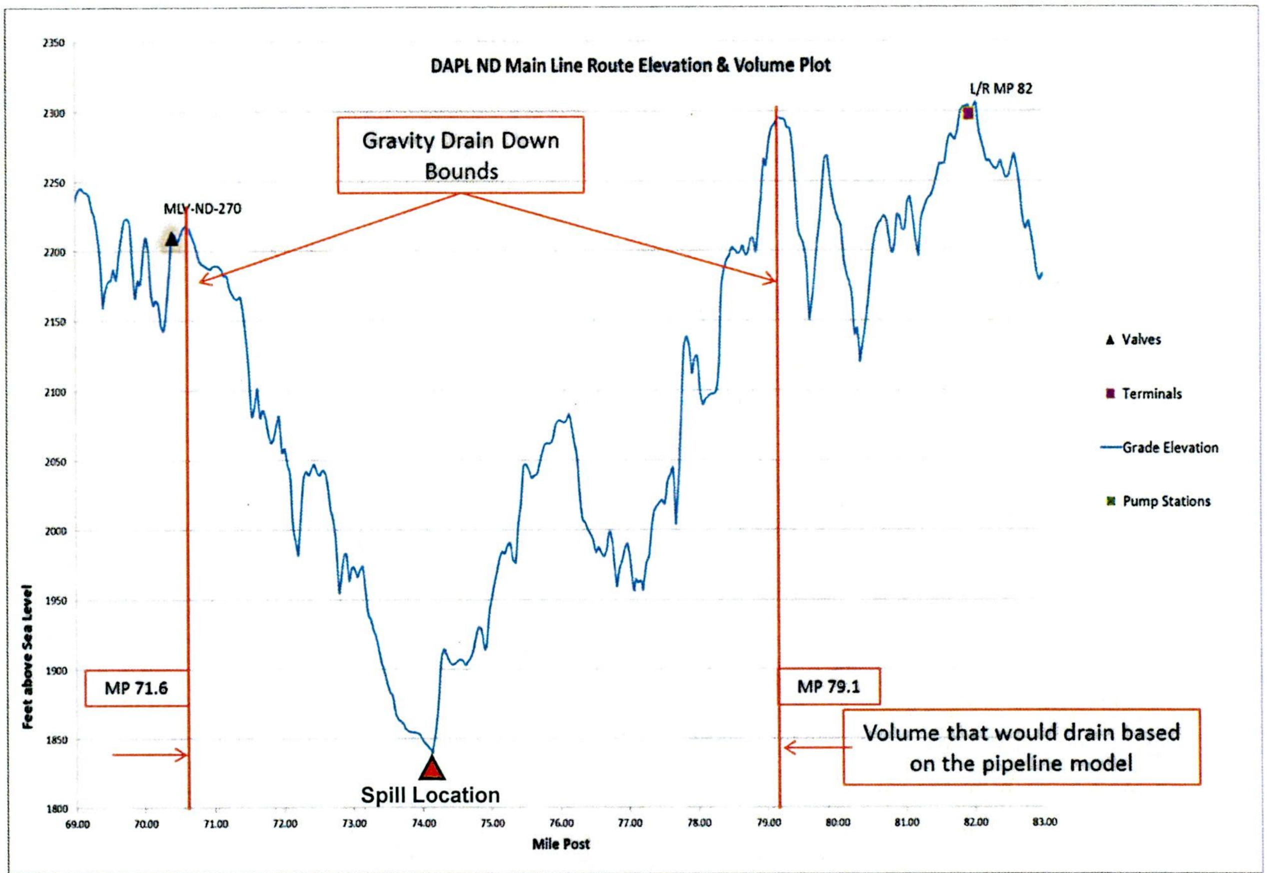
5.0 MODEL RESULTS



The largest calculated volume occurs at milepost 74.13 miles. Based on the ultimate pipeline flowrate of 600,000 BPD, the volume would be 19,809 barrels of oil. The volume would be reduced to 18,872 barrels based on the initial flow of 450,000 BPD through the pipeline.

DAPL's expectation is that the spill frequencies and volumes presented in this analysis are not likely to occur, but are provided as a conservative framework to ensure Agency decisions are based on knowledge of the potential effects, as well as allowing for DAPL to prepare for the worst-case scenario in its emergency response preparations as required by applicable federal regulations.

While this analysis reflects a maximum spill volume, actual incident data from the Hazardous Liquid Pipeline Risk Assessment (California State Fire Marshal 1993) indicates that spill volumes are significantly less than the maximum volume calculated by the model. For example, in 50% of actual incidents, the spill volume was less than 0.75% of what the model predicted. In 75% of actual incidents, the spill volume was less than 4.6% of what the model predicted.



Worse-Case Scenario - Spill release based on the PHMSA model – Full-diameter opening with full pipeline drain down due to air purge.

The volume is 19,809 barrels based on the ultimate flow of 600,000 BPD through the pipeline. The volume is 18,872 barrels based on the initial flow of 450,000 BPD through the pipeline.

- Hydrostatic testing of the pipeline to 125% percent of the Maximum Operating Pressure (MOP).
- A continuous pipeline monitoring system (Supervisory Control and Data Acquisition [SCADA]) that remotely measures changes in pressure and volume on a continual basis. This measurement data is immediately analyzed to determine potential product releases anywhere on the pipeline system.
- Meter comparison system that continuously verifies meter flows match at multiple points along the pipeline in real-time.
- Periodic pipeline integrity inspection programs using internal inspection tools to detect pipeline diameter anomalies indicating excavation damage, and loss of wall thickness from corrosion.
- Periodic above-ground Close Interval Surveys (CIS) conducted along the pipeline.
- Aerial and ground surveillance inspections. The aerial inspections will be conducted 26 times per year (not to exceed 3 weeks apart) to detect leaks and spills as early as possible, and to identify potential third-party activities that could damage the pipeline.
- Mainline valves are installed along the pipeline route to reduce or avoid spill effects to PHMSA-defined HCAs.
- In the unlikely event of a spill, the implementation of these measures, along with the leak detection program, will significantly reduce both the likelihood and impact of such an incident.
- Implementation of a Public Awareness program
- Participation in "One-Call" and "Before You Dig" notification systems.